Volume 9, No. 1—July 2000

MotherCare™ Matters

A Quarterly Newsletter and Literature Review on Maternal and Neonatal Health and Nutrition

Costs of Maternal & Newborn Health Care

A major challenge to most governments in both developed and developing countries is covering the cost of providing quality health care to their populations. This issue of *MotherCare Matters* addresses one facet of this larger problem: **How can governments estimate the cost and plan for the necessary funding to provide quality maternal and newborn services for the majority of the populations in developing countries?** Other than theoretical models of per capita costs for maternal health care, governments have few guidelines to help them address key cost issues—service coverage (human resources and health service infrastructure); supplies, drugs, and equipment for all levels of the health system; and the recurring costs involved in provider in-service training and community education.

Many countries in the Americas, such as Bolivia, Guatemala, and Peru, are planning major health care reform initiatives that involve the decentralization of health care service provision. In these particular countries, maternal and newborn health care is included in the reform packages. The issues of cost and cost recovery are central themes to these policymakers.

In the late eighties, African health ministers defined a strategy for reforming the health sector. The strategy was based on expanding primary health care and decentralizing the management of local health facilities, as well as initiating users' fees to improve drug supply. By the early nineties, nearly all of the Sub-Saharan African countries had some form of cost-recovery scheme in place.[1]

The Newly Independent States (NIS) of the former Soviet Union have struggled with the Soviet legacy since the transition to open societies, particularly in the realm of health care. The NIS is currently facing the complex issues of cost and financing for health services. Under the Soviet system, there were no costs for services to the consumer. This "no cost for services" system still exists in the NIS. Thus, there is a high utilization of services. The cost of running facilities has been, and still is, frequently based on hospital occupancy. Therefore, the treatment regimes and length of patient's stay may be unnecessarily long and costly to the governments.

This issue of *MotherCare Matters* presents two cost studies, one in Kenya and one in Bolivia, each showing different models to estimate the costs of maternal health services, supplies and medications, and equipment. These instruments are useful for policymakers and health administrators in standardizing costs at the national and local levels. In addition, these studies examine the use of performance standards to provide quality services and to estimate the cost of implementing these standards with the required resources (see Insert, **Comparison of Safe Motherhood Costing Spreadsheet**).

Also in this issue, a study from Guatemala examines the cost of normal vaginal deliveries at a community center as compared to a referral hospital. The cost study in three African countries assesses the cost efficiency of service delivery at public and mission health centers and hospitals and determines if management improvement achieves cost savings without jeopardizing the quality of services.

The cost of essential obstetric care can be high if there is an inappropriate or unnecessary use of technology and drugs. However, since most deliveries are normal, less intervention is better. The Ukraine article on Family-Centered Maternity Care (FCMC) clearly documents the cost-effectiveness of

[1] Atim, Chris. *Contribution of Mutual Health Organizations to Financing, Delivery, and Access to Health Care: Synthesis of Research of Nine West and Central African Countries*. PHR Technical Report No. 18. Bethesda, MD: Abt Associates. July 1998.

fewer interventions for normal deliveries, as well as the resulting client satisfaction.

Payment mechanisms have not been covered in this issue. However, The Partnerships for Health Reform (PHR) has conducted studies on users' fees and other cost-recovery mechanisms based in Eastern, Central, and Southern Africa.[2,3] Based on these findings, we know that clients will pay fees if they believe that quality services are available to them.[3]

Conclusion

Models for calculating the cost of maternal health care have been piloted and found to be useful tools for policy and decision-makers. The models are useful in standardizing costs and supporting quality services. It is important that these tools receive wider dissemination, as many countries in Africa and South America undertake major steps to implement health care reform strategies. Technical assistance in applying these tools to local standard treatment guidelines must also be available to countries.

Several of these studies underscore the high cost to the government and the client of providing care for routine services and normal deliveries at referral hospitals versus the local health care centers, which offer quality services with trained providers. While the health center is a logical solution to cost-efficient care, it requires the political will of the government to upgrade the capability of health centers to provide 24-hour coverage by trained providers. Unfortunately, in some countries, the delegation of responsibility to peripheral health providers is still met with resistance by local physicians and policy-makers.

In the U.S. and other countries, the cost of service provision is increased by the overuse of diagnostic technologies. As pointed out in the Ukraine study, less intervention during normal delivery is safer for the mother and newborn, and there are lower costs to the service delivery and the family. There is no evidence to support the routine use of high technology for normal pregnancies and deliveries. Therefore, in most cases, less intervention is best.

Colleen Conroy
Deputy Director, MotherCare

[2] Musau, Stephen. *FCA Community-Based Health Insurance: Experience and Lessons Learned from East Africa*. PHR Technical Report No. 34. Bethesda, MD: Abt Associates. August 1999.

[3] Fiedler, Jack, Ann Levin, Dennis Mulikelela. *A Feasibility Analysis of Franchising the PROSALUD/Bolivia Primary Health Care Service Delivery in Lusaka, Zambia*. PHR Technical Report No. 15. Bethesda, MD: Abt Associates. November 1998.

Optimizing Health Funds—Planning for Reproductive Health Services in Kenya and Zambia

Inga Adams and Robert Burn

Prepared under Management Sciences for Health, Rational Pharmaceutical Management (RPM) Project Cooperative Agreement with USAID No. HRN-A-00-92-00059-13

The World Health Organization estimates that each year over half a million women in developing countries die because they lack access to safe, effective, and affordable reproductive health services. In response to these and other striking statistics, the 1994 International Conference on Population and Development created a Programme of Action to make reproductive health (RH) care more available. Consequently, many donor agencies, governments, and non-profits have amplified their RH activities and placed more emphasis on supplying the drugs, medical supplies, and other commodities necessary for improving RH care.

When planning for RH care, many programs lack critical information on current treatment practices, a reliable needs assessment, and realistic cost data—all are essential for estimating the cost of running a functional RH program in a particular setting. The Cost-Estimate Strategy (CES) tool helps acquire and analyze such information for budgeting, planning, and policy purposes.

In 1997, the CES tool was field-tested in **Kenya** and subsequently applied to develop commodity budgets at a Kenyan provincial hospital. In **Zambia**, the CES approach helped define and quantify commodity issues for the national integrated reproductive health care strategy, resulting in better informed and more supportive donors. These implementations reveal that by using the CES to estimate commodity requirements and needs, RH programs can enhance their budgeting and planning processes.

Background and Methodology

In 1995, representatives of the U.S. Agency for International Development (USAID), the Rational Pharmaceutical Management (RPM) project of Management Sciences for Health (MSH), and the MotherCare project formed the "RH Working Group" to develop a tool that would assist RH program managers, governments, and the donor community to better estimate the costs of RH commodities. As a result, the group developed the CES, providing a framework for incorporating RH commodity cost information into RH policy and program decisions.

CES users begin by ascertaining the principal health conditions that affect clients seeking RH services. Standard treatment guidelines (STGs), needed drugs, medical equipment, and supplies are then defined for each condition or service based on international standards. The CES Survey tool helps users collect cost, treatment, epidemiological, and demographic data through reviewing medical records, interviewing pharmacy professionals and clients, and observing drug-dispensing practices.

Data collection is followed by the needs quantification and costing exercises that are at the core of the CES methodology. The various spreadsheet models can assess "what-if" scenarios by substituting alternative drugs and/or prices. Comparisons between the models enable program managers to identify the cost implications of alternative services and treatment protocols.

CES Field Test

The CES field test was conducted in Kenya in 1997, in collaboration with the Ministry of Health (MOH) Division of Primary Health Care. Kenya was selected because it was attempting to implement a useful RH policy in the face of low quality of care, financing issues, traditional practices that hindered use, and in particular, a lack of reliable information on costs and practices.

To start, RPM and local partners selected 22 RH conditions and services for study and defined the STGs and other baseline information required for each condition. The study included trained data collectors who surveyed 56 government, mission, and private health care facilities in five districts across Kenya. Seventy private retail pharmacies were also surveyed.

The information collected enabled managers to calculate the total cost of treating each condition.

Box A—Key Findings of CES Field Test in Kenya

- Only 9% of all facilities had all of the necessary equipment in stock to treat the 22 RH conditions studied.
- 50% of women purchased commodities for their deliveries, usually cotton gauze and gloves, spending an average of 108 KSh (about US$2).
- Availability of key RH commodities was uneven, contributing to low service utilization.
- There were major discrepancies between recommended treatments and services and the actual knowledge and practices of health care providers.

Analysis of the site survey data also revealed several issues in RH care provision (e.g. compliance with Kenyan standard treatment guidelines, availability of drugs and supplies). Perhaps most significantly, the data enabled managers and donors to identify key gaps in RH services and allocate funding and target interventions more appropriately.

During the field test and a subsequent dissemination workshop, participants reported that the CES indeed provided a rational basis for estimating the cost of and funding for a defined package of services at any administrative level. The data could also be used to monitor the availability and use of RH commodities over time and to develop in-service training methods for RH personnel. The RH Working Group modified and streamlined the CES based on the results of the field test. See **Box A** for key CES field-test findings in Kenya.

CES Application

Kenya

Following the CES field test, the USAID-funded AIDS, Population and Health Integrated Health Assistance (APHIA) project and the Japan International Cooperation Agency (JICA) chose to apply the CES in a newly renovated hospital maternity ward in Kenya. The CES was used there to help plan for the expansion of the hospital's RH services, specifically to quantify the costs of pharmaceuticals and other commodity needs for the maternity ward.

Hospital personnel identified 14 major RH services provided at the hospital and defined the survey parameters for each. Through analysis of the data collected using the CES Survey tool, the team estimated that four RH conditions accounted for over 80 percent of the total RH commodity requirements, reflecting the high volume of services for antenatal care, spontaneous vaginal delivery, C-section, and neonatal care—though individual case costs are not significantly high. See these and other findings in **Box B**.

The hospital used the findings to develop commodity budgets for the new maternity ward. In addition, the hospital institutionalized a CES committee responsible for updating and using CES data on a regular basis.

Zambia

In 1998, the Zambia Central Board of Health (CBOH) and the Ministry of Health, recognizing that maternal mortality and morbidity are largely preventable, began drafting a five-year Integrated Reproductive Health Action Plan. The Zambian government identified the essential role of pharmaceuticals, medical supplies, and other RH commodities in making the new plan a functioning reality.

Box B—Key Findings of Kenya Hospital Implementation

- Four RH conditions accounted for over 80% of estimated total commodity requirements.
- Actual consumption of drugs and supplies significantly differed from estimated needs, probably because of low stock levels, stockouts, or deviations from STGs.
- Pharmaceutical and non-pharmaceutical costs were almost equal, highlighting the importance of each in providing maternal care.

Several recent reforms have directly affected Zambia's pharmaceutical sector, such as a new National Drug Policy, the decentralization of health services, and the establishment of an independent drug regulatory body. The Zambian government and USAID's Zambia Integrated Health Project used

Box C—Key Findings of CES Implementation in Zambia

- The three RH conditions and services with the highest costs per case were puerperal sepsis, family planning, and Cesarean section.
- For 66% of the conditions studied, treatment costs were estimated to be higher when supplies were purchased using local rather than international costs.
- Half of the estimated total drug and supply costs for addressing all 14 RH conditions, excluding family planning, were attributable to basic antenatal care.

the CES tool to assess the supply and cost of commodities for RH services. In June 1999, a team of RPM staff, CBOH and MOH officials, and others implemented the CES at 14 hospitals and 139 health centers in 11 Zambia Integrated Health Project districts.

Local experts identified 14 RH conditions for study, defined the STGs for each condition, and established other survey parameters. Data collectors visited sites in June and July 1999, and the data were analyzed using the CES spreadsheet tool. The key findings are summarized in **Box C.**

As a result of the effort, donor agencies are currently using the CES data to help determine funding levels in country. The process as a whole has contributed to closer coordination between donors and organizations working in the RH sector. It also heightened awareness of and stimulated discussion about the real costs of offering RH services.

The cost estimates will facilitate improved management of RH services in the 11 Zambia Integrated Health Project districts. In addition, the development of standard treatment guidelines was pushed forward for use by all facilities. As with other CES applications, valuable commodity availability data were gathered in Zambia Integrated Health Project districts that can be used, for example, to monitor and evaluate RH commodity availability at each facility or to focus training interventions for facility staff.

MotherCare Bolivia—Cost Study of the Mother-Baby Package in Bolivia

Katherine Capra, MotherCare, Bolivia; Eva Weissman, MotherCare Consultant; Craig Lissner, WHO; Guillermo Seoane, MotherCare Bolivia

Prepared under MotherCare Contract with USAID No. HRN-5966-Q-00-3039-00

Background

In an effort to reduce maternal and child mortality by increasing the use of maternal and under-five (years of age) services, Bolivia decentralized its health system and implemented the National Insurance for Mothers and Children program (SNMN, Spanish acronym) in the mid-1990's. Under this reform, municipalities receive 20 percent of national revenues on a per capita basis and are responsible to provide health services to their population.

MotherCare Bolivia, in collaboration with the World Health Organization (WHO) and the Partnerships for Health Reform (PHR), conducted a study to analyze the cost of providing the services presently covered by SNMN and to estimate the future cost of implementing new national standards for maternal and newborn care. These figures were then compared to the resource allocation set by SNMN. WHO's *Mother-Baby Package Costing Spreadsheet* (MBPCS), an easy-to-use, Microsoft® Excel-based tool, was utilized in the cost study at the three different levels of health facilities (hospitals, health centers, and health posts) in MotherCare's five districts.[1] This study could also be used to help health planners and local authorities obtain a general idea of the cost of providing quality services according to national performance standards. In addition, the study promotes the use of new costing models, like the MBPCS, by technical and administrative staff in order to easily and rapidly obtain cost estimates for a package of maternal and neonatal services at the district, municipal, or departmental levels.

[1] World Health Organization. *Mother-Baby Package.* Geneva: 1998.

Table 1—Summary of Current, Standard, and Additional Costs by District in U.S. Dollars, Bolivia, 1998

	Current cost of maternal-neonatal health care services (60% coverage)		Cost of providing maternal-neonatal care according to new standard (90% coverage)		Cost difference between current and new standard package	
District	Total Cost	Cost per Capita	Total Cost	Cost per Capita	Total Cost	Cost per Capita
El Alto	$413,914	$2.76	$830,541	$5.54	$416,627	$2.78
Santiago de Machaca	$238,706	$2.63	$666,194	$7.33	$427,488	$4.70
Valle Bajo (Quillacollo)	$827,050	$3.06	$2,088,408	$7.73	$1,261,358	$4.67
Sur Oeste (Capinota)	$150,568	$3.42	$334,817	$7.60	$184,249	$4.18
Valle Puna	$246,593	$2.31	$595,123	$5.58	$348,530	$3.27
Total	**$1,876,831**	**$2.84**	**$4,515,083**	**$6.83**	**$2,638,252**	**$3.99**

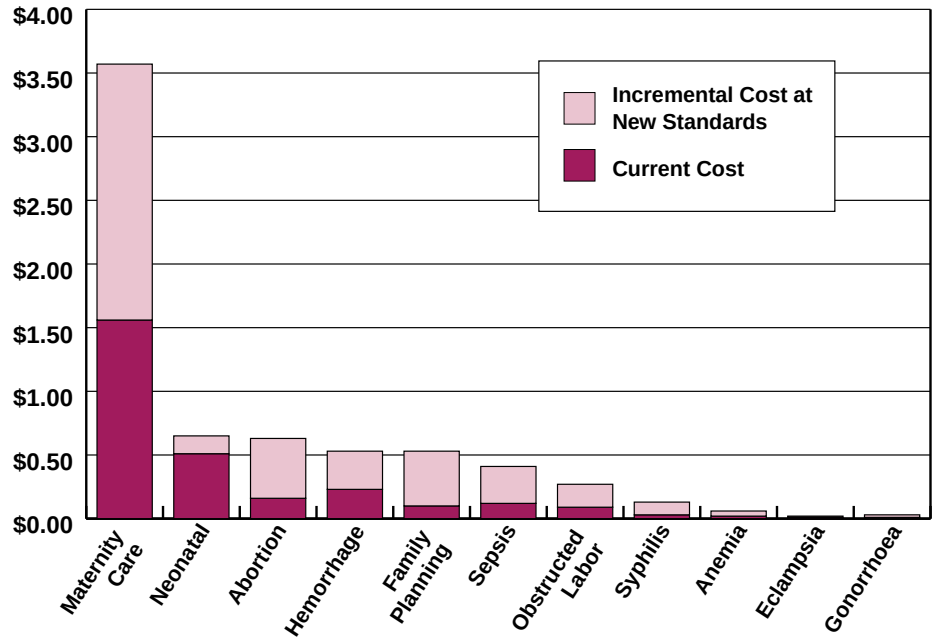
Methodology

The field work for the costing model in the five MotherCare target districts was carried out in April and May 1997. For each district, two models were used—one to assess the cost of maternal/neonatal health care currently provided (maternity care, diagnosis and treatment of complications, essential obstetric care, and neonatal care), and the other to assess how much it would cost to provide care for the same components according to the recommended treatment in the national performance standards. The cost estimates obtained from current and standard practices were then compared against the reimbursement rates set by the SNMN program. This costing model differs from the CES tool in the previous abstract because it determines not only drug, supply, and equipment costs, but it also estimates staff labor costs from recall of time spent and amortizes capital costs of buildings, vehicles, and large equipment.

Results

Maternal/neonatal care in the five districts costs an average of $2.84* per capita, per year. The costs vary per district, depending on the number of service centers available for the given population. However, in order to provide maternal/neonatal health care according to the new national standards (1996), it will cost $4.60 per capita for an estimated coverage of 60 percent. To achieve the Bolivian government's goal of 90 percent coverage with the

Graph 1—Current and Incremental Cost by Intervention (US$ per capita)



MotherCare Bolivia, 1998

* All monetary figures are in U.S. dollars, 1998.

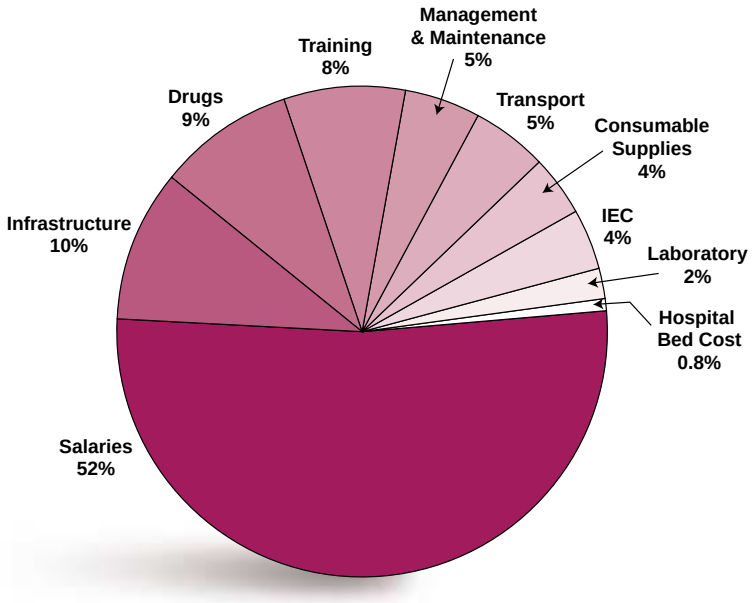
new national standards, the per capita rate will be $6.83, requiring an increase of $3.99 per capita, per year **(see Table 1)**. These costs are comparable to the estimates found in *Making Motherhood Safe*[1] where the estimated cost of reducing maternal mortality ranged from $2.00 in a weak health system to $5.00 in a more developed health system.

It is important to note that the largest increase in cost between the current services (60% coverage rate) and the goal (90% coverage rate) is in maternity care **(see Graph 1)**. Maternity care is the most comprehensive of the services, enompassing antenatal, delivery (including Cesarean section if needed), and postpartum care and has the largest demand. Maternity care accounts for 50 percent of the total additional cost.

In terms of input, salaries will make up 52 percent of the additional costs, mainly because it is assumed that the increase in coverage from 60 to 90 percent will make it necessary to increase the number of medical staff providing maternal and neonatal health services **(see Graph 2)**. Since infrastructure costs make up a substantial part of the additional cost, a sensitivity analysis was performed, which assumed that existing facilities would be able to deal with the increased client load.

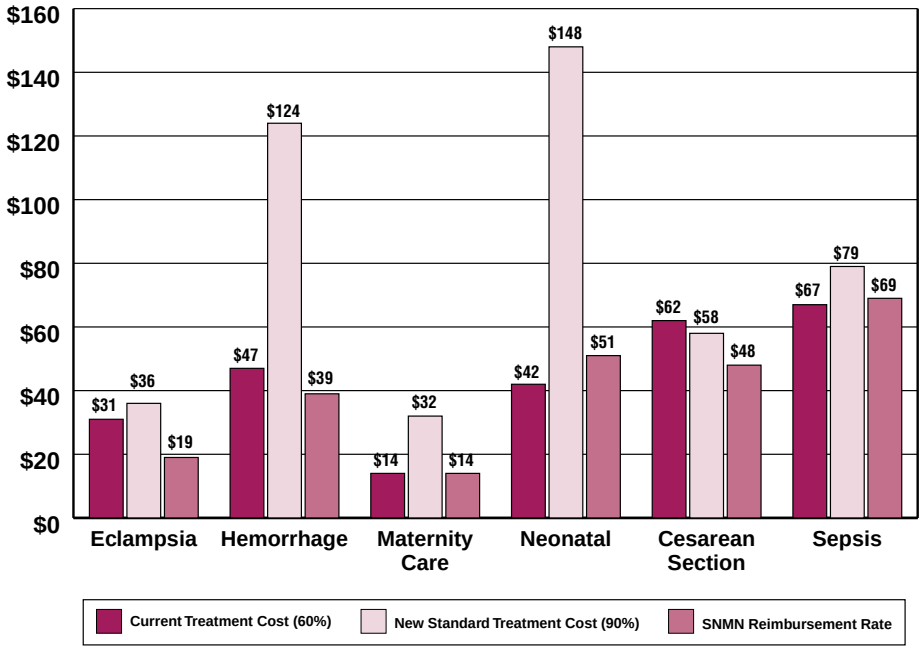
Some of the SNMN interventions, such as

Graph 2—Additional Cost by Input



MotherCare Bolivia, 1998

Graph 3—Difference Between Actual Treatment Costs and Reimbursement Rates (Variable Costs Only)



MotherCare Bolivia, 1998

[1] Tinker and Koblinsky. *Making Motherhood Safe*. 202 World Bank Discussion Papers. Washington, DC: 1993

management of childhood illness, are not included in the *Mother-Baby Package*. Similarly, treatment of abortion complications and severe anemia is not covered under SNMN (although they may be in the future). Of the interventions that *were* comparable, current SNMN reimbursement rates were almost always *lower* than the cost of the current treatment. The difference was greater when the *new* national standards were compared to the present reimbursement rate. Additionally, the current reimbursement rate only covers variable costs for services, but not salaries or infrastructure **(see Graph 3)**.

This study highlights the need for governments, local and national, to have accurate cost information when implementing new health reforms. The WHO *Mother-Baby Costing Model* can be used to better estimate the fixed and variable costs incurred at the individual facilities, allowing funds to be assigned in a more efficient manner.

Comparative Costs of Normal Delivery at a Hospital and a Community Maternity Center in Guatemala

Elizabeth Bocaletti, MotherCare Guatemala, John Bratt, MotherCare/FHI, Herberto De Leon, Hospital General de Occidente, Quetzaltenango, Guatemala

Background

In response to the problem of limited access, particularly to services in rural areas, the Ministry of Health/Guatemala, local health officials, providers, and community members promoted the building of community maternity centers in isolated health areas. The purpose of these community maternities is to provide culturally sensitive, family-centered services in a safe environment for normal deliveries. The successful functioning of these maternities is dependent on building and maintaining a partnership between hospitals and the community members who assume responsibility for establishing the centers. The community must also support the trained providers (in some areas a resident physician or a nurse auxiliary), who work side-by-side with local traditional birth attendants (TBAs). The TBAs are encouraged to deliver their clients at the maternity center. In that way, complications can be recognized and managed or referred early. The health areas and hospitals often provide a vehicle for referrals.

The first community maternity was established in 1990, in San Carlos Sija, a small town in the Guatemala highlands about 35 miles north of Quetzaltenango. This maternity was developed under the initiative of the Chief of Obstetrics and Gynecology in the Hospital General de Occidente (HGO), the referral hospital in Quetzaltenango. The community maternity is lodged in the unused section of the San Carlos Sija Health Center with the approval of the Health Center Director, and the facility is maintained by a community health committee. It is staffed by rotating residents from Hospital General de Occidente, and the community assumes the responsibility for their lodging, food, and laundry. The client pays a small fee (on a sliding scale) for delivery care and must reimburse the maternity for the cost of any medications and/or petroleum for the HGO-provided ambulance in the event of a referral.

The resident trains local TBAs and either the resident or the TBA assists at the delivery. The resident also provides antenatal and postpartum care. All women with risk are referred to the HGO and women with intrapartum or postpartum complications are taken by the resident and the TBA (if she is the TBA's client) to the HGO.

There are approximately 1000 births in this community per annum, and about ten percent of these births occur in the community maternity. The majority of other births are at home with a TBA, with less than ten percent having hospital delivery. The families are happy with the family-centered approach to care in the maternity; the residents recognize the benefit of learning traditional midwifery techniques from the TBAs; and the TBAs appreciate

having a safe place to practice and learn, as well as the perceived respect they receive from the resident and the HGO staff. Since the maternity center's inception, there have been no maternal deaths in the community.

Methodology

The purpose of this study was to compare the costs of attending uncomplicated vaginal deliveries (UVD) in the two facilities—the referral hospital (HGO) and the San Carlos Sija Maternity Center (SCSM). Cost estimates were developed by identifying all resources (staff, materials, and capital) required for the service and assigning a value to each resource based on market value.

Data from the two sites were collected from February through May 1996. Because the HGO was moving to a new site during this period, 1995 data were also collected from both sites in order to represent the comparable costs in a more stable situation.

Data on "out-of-pocket" client costs were also collected by interviewing a convenience sample of recently delivered women at each facility. The women selected from the HGO were women who lived in San Carlos Sija or the surrounding area served by the San Carlos Sija Health Center.

Results

Cost Per UVD at the Two Sites

Table 1 presents a summary comparison of the total costs and costs of major resource categories at the study sites. The cost of a UVD is 27 quetzales (or 12%) higher at the HGO than at the SCSM. Much of this difference is due to higher costs of personnel and miscellaneous recurrent costs at the HGO, which outweigh the higher equipment and furniture costs at the SCSM.

Considering the marked difference in the number of UVDs per month at the two sites (the HGO has nearly 29 times as many UVDs as the SCSM), one might expect the cost per UVD to be lower at the HGO because of economies of scale. But unit costs are actually higher at the HGO than at the SCSM because the labor and delivery process involves a larger set of resources. This does not imply that the quality of services at the HGO is higher, but the service includes more elements and therefore consumes more resources. For example, personnel costs at the HGO include staff in medical records, labor and delivery, the recovery room, and neonatal areas. At the SCSM, all of these functions are carried out by the resident or the TBA, with limited assistance from the clinic staff. Another example is miscellaneous recurrent costs, which are higher at the HGO because of higher laundry costs (due to larger numbers of staff involved in the labor/delivery/postpartum process) and costs of patient meals (which are not provided at the SCSM).

Table 1—Cost of an Uncomplicated Vaginal Delivery (UVD) by Site*

Resource Category	Hospital General de Occidente	San Carlos Sija Maternity
Personnel	$16.00	$14.83
Disposable Supplies and Medicines	$14.00	$12.08
Equipment and Furniture	$0.50	$6.00
Miscellaneous Recurrent Costs	$10.33	$4.00
Total (quetzales) $1=Q6	**Q245**	**Q218**
Total (US$)	**$41.00**	**$37.00**
Average UVDs per month	**287**	**10**

*1995 figures, $1US=6 Quetzales

Table 2 presents more detail on personnel costs. In the first column, the total monthly salary costs allocated to UVDs are presented by type of staff. For the HGO, these costs have been adjusted for the percentage of bed-days (61%) incurred by women with non-complicated deliveries. For the SCSM, the resident's UVD salary represents the estimated percentage of time he or she spent on UVDs (13%). The TBAs' UVD salary represents 100 percent of their time, and the health center personnel's UVD salary represents the small amount of time they spent on UVDs each month. The second column shows the cost per UVD associated with each staff classification. The cost per UVD for each staff classification is generally lower at the HGO, but because so many more persons are involved in the delivery/postpartum process at the HGO, total staff cost per UVD is higher.

Equipment and furniture costs are the only resource category where costs are lower at the HGO. This difference is explained by economies of scale. **Table 3** presents information for selected items in the equipment inventories of both sites.

Table 2—Staff Costs per UVD by Staff Category and Site*

Staff Category	Total UVD Salary per Month	Cost per UVD
Hospital General de Occidente		
Attending Physician	$464.33	$1.62
Resident III	$49.33	$1.47
Resident II	$327.17	$1.13
Resident I	$415.50	$1.45
Graduate Nurse	$474.00	$1.65
Auxiliary Nurse	$1347.00	$4.70
Housekeeping	$126.17	$0.43
Medical Records Staff	—-	$3.55
Total	**$2689.84**	**$16.00**
San Carlos Sija Maternity		
Resident	$65.50	$6.50
Trained TBA	$75.00	$7.50
Health Center Staff	$8.33	$0.83
Total	**$148.83**	**$14.83**

*1995 figures, $1US=6 Quetzales

The third column, "deliveries per unit, per month," is an indicator of utilization. It is derived by dividing the number of monthly deliveries (287 at the HGO, 10 at the SCSM) by the quantity of the item as shown in column two. For example, at the HGO there is an average of 6.9 deliveries per month for every hospital bed. The corresponding value for the SCSM is 1.7, which shows that hospital beds are used much less intensively at the SCSM than at the HGO. Therefore, even though the monthly cost of hospital beds (column 4) is higher at the HGO, the cost per delivery (column 5) is much lower.

Although results presented thus far have shown that the SCSM is a lower-cost provider of UVDs than the HGO, costs at the SCSM could decline even further with only modest changes in output. To illustrate this point, we constructed two scenarios to show the impact of increasing monthly output to 15 and 20 UVDs, respectively. Only fixed costs are affected by changes in output; therefore, any reductions in the total cost per UVD are achieved by spreading fixed costs over a larger number of UVDs (see Table 4).

The first three rows of Table 4 show how the average fixed cost (AFC) is calculated for the observed output level of 10 UVDs. Total fixed costs are then estimated simply by multiplying the AFC by 10 UVDs per month. Average fixed costs for the two scenarios are then calculated by dividing total fixed costs by the hypothetical output levels of 15 and 20 UVDs per month. Total cost per UVD would decline to $29.00 if the SCSM were to increase monthly output to 15 UVDs per month; if output increased to 20 UVDs, the cost per UVD would fall to $25.33.

Comparison of Costs to Clients at the Two Sites

To this point, we have focused exclusively on the costs incurred by the HGO and the SCSM to provide UVDs. But another important factor to consider in comparing costs at the two sites is the out-of-pocket expenditures made by clients. Responses to the small survey of recent patients of the HGO and the SCSM are presented in Table 5. Women who had traveled to Quetzaltenango to give birth at the HGO reported much higher out-of-pocket costs than those who delivered at the SCSM. Main differ-

Table 3—Comparison of Equipment Utilization and Costs by Site*

Equipment Items	Quantity	Deliveries per Item per Month	Monthly Cost	Cost per UVD
Hospital General de Occidente				
Hospital Bed	42	6.9	$135.67	$0.46
Examination Table	3	96	$7.00	$.03
Medicine Cart	2	144	$19.17	$0.66
Fetoscope	5	58	$10.50	$0.03
San Carlos Sija Maternity				
Hospital Bed	6	1.7	$19.33	$1.93
Examination Table	2	5	$4.66	$0.47
Medicine Cart	2	5	$19.16	$5.75
Fetoscope	1	10	$2.16	$0.22

*1995 figures, $1US=6 Quetzales

ences were in transport, where HGO clients spent more than twice as much as SCSM clients, and in prenatal care, where the average cost for HGO clients was inflated by clients who sought care from private-sector providers.

Conclusions

The results of this study show that attending uncomplicated vaginal deliveries is less costly at the SCSM than the HGO. Costs to the government (e.g., service delivery costs) are lower, and out-of-pocket costs to the client are lower. The results also show that SCSM service delivery costs could be reduced by small absolute increases in output.

The advantages of the SCSM should be portrayed in a broader context than just costs of UVDs. The SCSM also:

1. improves the safety of a home-based TBA system by providing screening, treatment, or referral for obstetric risk and complications during labor and delivery;
2. provides a local alternative to home delivery for women with low to moderate obstetric risk;
3. provides an inexpensive mechanism to refer women to the HGO when serious complications arise;
4. allows the OB/GYN resident physicians an opportunity to practice community medicine during their training period and to learn about the realities of the problems faced by women and TBAs as they try to implement Safe Motherhood at the level of a rural community; and
5. has demonstrated how to make basic obstetric care culturally acceptable to indigenous Guatemalan women by providing family-centered, user-friendly services (including elements such as participation of family members and TBAs, delivery in the women's choice of position, respect for Mayan religion and beliefs about nutrition and temperature, respect for women's modesty, etc.).

Table 4—Calculation of Impact of Additional UVDs on the Cost per UVD at the SCSM*

Total Cost per UVD at the SCSM (10 per month)	$36.33	
MINUS Variable Cost per UVD (includes disposable supplies, laundry and health center staff support)	$14.33	
EQUALS Average Fixed Cost (AFC) per UVD	$21.67	
Total Fixed Cost per Month ($22.00 x 10 UVDs)	$220.00	
Average Fixed Cost (AFC1) per UVD assuming 15 UVDs per month ($220.00/15)	$14.67	
Average Fixed Cost (AFC2) per UVD assuming 20 UVDs per month ($220.00/20)	$11.00	
Total Cost per UVD assuming 15 UVDs per month (AFC1 + VC = $14.67 +$14.33)		$29.00
Total Cost per UVD assuming 20 UVDs per month (AFC2 + VC = $11.00 + $14.33)		$25.33

*1995 figures, $1US=6 Quetzales

Patient's out-of-pocket expenses were higher when they delivered at the HGO even though the hospital did not have a cost-recovery system in place, while the SCSM charged fees (albeit modest ones) for the services supplied in attending births. Transport cost was the largest out-of-pocket expense for the HGO clients. The average expenditure for transportation to the HGO was about double the average fee charged for delivery attention at the SCSM. Also, the SCSM fees did not appear to be a barrier to service utilization.

Table 5—Costs to Clients Using the HGO and the SCSM*

Expenditure	HGO (N=7)		SCSM (N=10)	
	Range	Mean	Range	Mean
Transport	$10.33 - $14.67	$28.50	$0 –$16.67	$9.00
Labor and Delivery	N/A	N/A	$5.83 -$21.66	$14.00
Trained Midwife	$3.33 –$16.67	$4.33	$0 –$5.83	$2.00
Prenatal Check-up	$2.50 –$14.67	$11.50	$1.00 -$3.00	$1.83
Postnatal Check-up	N/A	N/A	$0 -$0.50	$0.33
Child Care	$0 –$1.67	$0.33	N/A	N/A
Time Lost From Work	$0 –$10.00	$4.00	$0 -$16.67	$3.33
Meals	$0 –$3.33	$1.17	$0 -$2.50	$0.83
Total		**$49.83**		**$31.33**

*1995 figures, $1US=6 Quetzales

In summary, costs for attending normal births are lower at the rural San Carlos Sija Maternity Center than at the referral hospital in Queztaltenango. However, lower cost is only one of the many factors that explain the use of the community maternity. Its proximity to the community increases accessibility. The availability of medical backup staff for TBAs and an emergency transport vehicle provide for greater safety. The family-centered care and respect for traditional practices in the birthing process, including respect for the TBA's role during the delivery process, make it a desirable birth setting for most indigenous women.

Strengthening Service Delivery—A Cost Study

Ann Levin, University Research Corporation, LLC.

Prepared under PHR Project with USAID number HRN-C-95-00024.

The Partnerships for Health Reform (PHR) recently completed three case studies on maternal health care costs in the African countries of Ghana, Malawi, and Uganda. The studies were conducted in collaboration with MotherCare and The Africa Initiative to assess the quality of maternal health care, to understand the reasons behind cost differentiation, to assess the efficiency of service delivery, and to determine if management improvements might achieve cost savings without harming the quality of services. These cost studies allow researchers to compare information on the provision and utilization of maternal health services offered in public versus mission hospitals, health care centers, or clinics.

PHR's studies are significant because little research has been done on the costs of maternal services in African countries. The cost research uses a variety of methodologies, making it difficult to draw conclusions across these studies. Moreover, few other studies look at the detailed use of personnel time through observation or collect information on quality indicators. The studies conducted by PHR provide information on the relative costs of public and mission hospitals and health centers for a range of services, including antenatal care, vaginal delivery, and cesarean section, as well as those delivered by private midwives and traditional birth attendants (TBAs). Other factors examined in the studies are the relationship of costs to quality and to client satisfaction and time spent by midwives/nurses on various administrative tasks and on non-work activities.

The objectives of the studies in the three African countries were to:

1. compare patterns of costs of maternal health care services across facilities in three African countries;
2. estimate costs of delivering key maternal health services;
3. assess provider efficiency;
4. estimate costs to consumers; and
5. determine cost recovery ratios.

Methodology

Data were collected from one district in each country on maternal health service delivery costs in 1998, at a public and a mission hospital and health center. Approximately 20 private midwives, 20 TBAs, and 120 clients were interviewed. Data collection techniques included provider observation, provider interviews, facility record reviews, and client exit interviews. The Ministry of Health (MOH), PHR, and local teams jointly planned the study and selected study sites that had relatively high utilization levels, acceptable quality levels, and availability of good financial records. Thus they are not representative of country facilities but were chosen as models of high quality service providers. Findings can be used to illustrate financing and efficiency issues that each MOH could address to strengthen service delivery in each country.

Results and Decisions

Provider Costs

In the three countries, estimated total operating costs for routine maternal health services in the twelve health facilities were less than $7* for antenatal care and $35 for normal delivery. Costs were higher for management of obstetrical complications due to the use of more and higher-level personnel and materials. For Cesarean section, for example, the unit costs ranged from $55.60 to $102.38 (**see Chart 1**).

The most costly components of the unit costs were materials (drugs, supplies, and laboratory tests). Indirect costs, consisting of support staff time, non-patient contact time, and prorated shares of maintenance and utilities, were also high and ranged from 23 to 44 percent of the total costs. Labor costs made up a smaller percentage of the total costs—on average 11 to 21 percent of the total costs (**see Chart 2**).

As expected, total costs per service were generally highest at the hospitals, reflecting a greater use of drugs and higher employment of skilled personnel. In addition, hospital indirect costs were higher than those at public health centers.

Chart 1—Unit Costs of Cesarean Section Services in Hospitals ($US)

Unit costs of cesarean section ranged between $56 and $102 and were higher in public than mission hospitals in two countries.

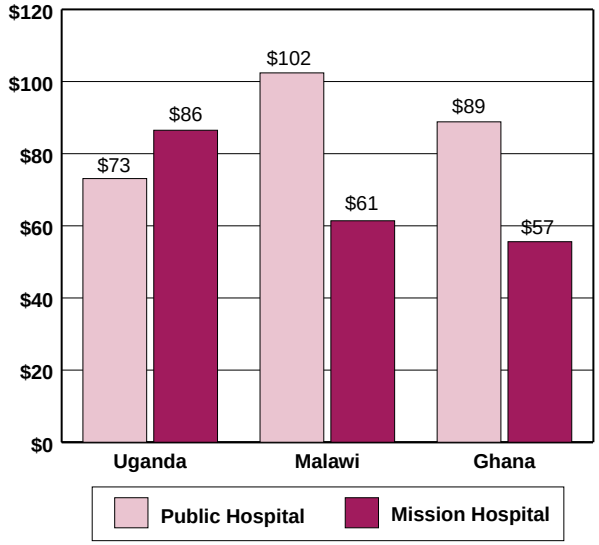
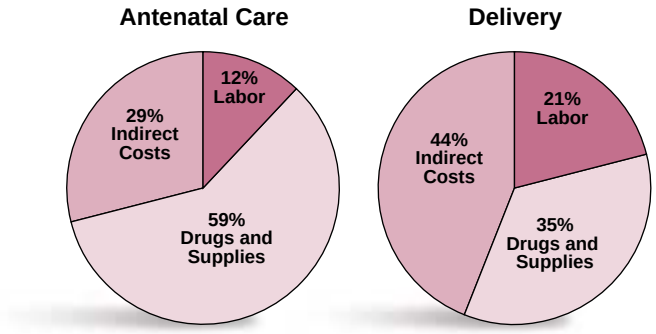


Chart 2—Percent Input Costs to Total Unit Costs of Antenatal Care



59% of the unit cost of antenatal care was for drugs and supplies; the largest component of costs for delivery was indirect costs.

The unit costs of maternal health services were generally higher at the mission health centers than the public health centers since more personnel time and materials were used in service provision. However, the unit costs of services in hospitals were found to be higher at the public facilities as compared to the mission facilities in Malawi and Ghana. Mission facilities were rated better than public facilities on a number of quality indicators, and the findings suggest that mission facilities were providing maternal health services at equal or higher quality than public facilities with slightly higher costs at the mission health centers than at the public health centers.

Provider Efficiency

These case studies provide several indications of the relative efficiency of the various providers in the sample. Provider costs in the sample reflect different mixes of staff and medications and other material, as well as different staffing patterns. The public hospitals were found to have an inappropriate number of staff given the number of maternal health services provided in their institutions (overstaffing in Uganda and Ghana and understaffing in Malawi). In addition, customers were not adhering to the referral systems in the three countries and were skipping over health centers to use more costly hospital services. In the health centers and some public hospitals, the utilization of maternal health services was low, driving up the unit cost of services since indirect costs were then divided among fewer services.

*All costs in U.S. Dollars, 1998.

The time that personnel spent on administrative activities was highest in facilities with low utilization. The time that personnel spent unoccupied or engaged in personal activities was eight to 16 percent, and that time was higher at health centers than hospitals for enrolled nurses/midwives.

Relationship of Cost to Quality

The cost of services was found to be related to structural quality (i.e. the availability of materials and equipment). However, other measures of quality, such as process indicators and client satisfaction, were not necessarily associated with cost. When materials and equipment were available, whether procedures were followed depended less on costs than on other factors such as how well a specific facility was managed, knowledge about standard protocols, and orientation toward client-centered care. These depend not only on how well facilities are managed more generally, but also on the availability of standard protocols at the central level and some effort to train health personnel in the management of personnel and resources.

Client Costs

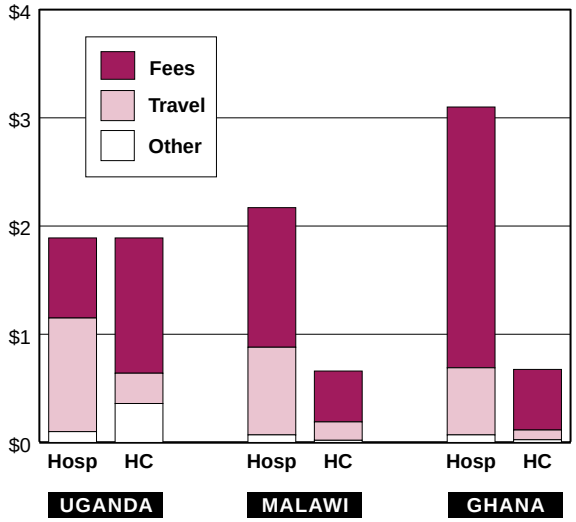
Total costs paid by patients (user fees, travel costs and other expenses such as food) ranged from $1.00 to approximately $3.00 for an antenatal care visit (**see Chart 3**), $6.00 to $18.00 at hospitals and less than $4.00 at health centers for normal deliveries, and $13.22 to $139.58 for a Cesarean section. The percentage of client costs spent on users' fees were sometimes lower than the costs of transport and other costs combined, particularly when users' fees were low, as in public facilities in Uganda. At the mission hospitals, however, the percent of client costs spent on high users' fees often exceeded other costs. It should be noted that clients using public health facilities often incurred additional costs to fill prescriptions they received at the facility.

Cost Recovery

Because of higher fees, mission facilities usually recovered a higher proportion of their costs than did public facilities. In addition, the wide variation in cost-recovery rates demonstrated that facilities in Uganda and Malawi were not setting their fees systematically.

Chart 3—Client Costs for Antenatal Care ($US)

Unit costs ranged from $1 - $3.10 for antenatal care and were higher at hospitals than health centers.



Conclusions

Simple conclusions cannot be drawn about the relationship among costs, efficiency, or quality of care at public and mission facilities. Higher costs were not necessarily associated with higher quality or a higher level health facility. Variations in staffing patterns and supply use suggest that no single model of efficient or cost-effective maternal health care exists.

Midwives in hospitals often deliver fewer babies than they could, and staff may be spending more time on administrative duties than they should. Facilities often were not setting their fees systematically in relation to costs nor did they have specific objectives in place related to cost recovery. Consumers face a confusing array of fees at facilities, and they have to make decisions about which facilities to use despite the lack of cost and other information available to them for a given maternal health service or service quality.

Recommendations

To improve the efficiency of service delivery:

- greater utilization of the lower levels of the health system should be encouraged;

- staffing should be adjusted at hospitals and health centers to meet needs;
- users' fees should be set systematically;
- districts/facilities should be assisted in setting fees or introducing prepayment schemes that ensure an adequate stock of medicines and supplies and are within the ability of the clients to pay; and
- governments should weigh the benefits of outsourcing or subsidizing mission facilities vs. improving service quality at public facilities.

Cost Impact of Family-Centered Maternity Care in Ukraine: Positive Clinical Indicators & Cost Efficiency—The Patient Wins

Bradford Else, TEO Resource Managers

Introduction

MotherCare initiated work in Ukraine with the goal of improving the maternity care system through a Family-Centered Maternity Care (FCMC) approach. The FCMC approach is generally familiar to maternity health care providers and clients in the United States, but it is a new concept in the Newly Independent States (NIS) of the former Soviet Union (**see Box 1**).

The principal objective of MotherCare/Ministry of Health in the Ukraine was to strengthen the quality of reproductive, maternal, and newborn health services as perceived by the client and the provider. In order to convince policymakers and program managers in the Ministry of Health of the potential cost-savings implications of FCMC, a cost-effectiveness study of the FCMC approach compared with traditional birthing practices was undertaken in the Ukraine. The author carried out the "cost study" with Ukrainian counterparts in the cities of Odessa and Donetsk over the course of a month in 1998.

The study's central question—***What is the cost impact of the integration of the FCMC approach into traditional maternal and newborn services?***—was approached using three hypotheses (**see Box 2**). The hypotheses were used to structure the research.

Methodology

In order to conceptualize FCMC cost-management information, a decision tree was designed,

Box 1—Definition of Family-Centered Maternity Care

Family-Centered Maternity Care (FCMC) is designed to meet the informational, social and emotional and physical needs of pregnant women and their families during pregnancy, childbirth, and postpartum. Emphasis is placed on education and preparation for childbirth so that the woman and her family can assume more active roles. FCMC invites the family's supportive presence during labor and birth, and focuses on enhancing and supporting the normal birth, screening for deviations from normal birth, and intervening only when deviations occur.

FCMC avoids the unnecessary use of invasive, uncomfortable or restrictive procedures. The approach encourages women to remain active during labor—to walk, sit up, change positions frequently, and assume whatever position is most comfortable (avoiding the supine and lithotomy positions). The approach also supports women who want to assume squatting and other upright positions for the second stage of labor and birth. FCMC provides for skin-to-skin contact between mother and newborn immediately after birth, minimal separation of mother and infant, and early initiation of breastfeeding. It also promotes rooming-in and other practices which facilitate breast-feeding and encourages contact between the newborn and other family members.

—Judith Rooks, CNM, DrPH

Box 2—Research Question

What is the cost impact of the integration of an FCMC approach within the traditional maternity system?

Hypothesis #1: The cost of maternal services in Ukraine will remain the same or decrease by integrating a Family-Centered Maternity Care approach to maternal care in the Ukraine.

Hypothesis #2: The quality will remain the same or improve by integrating a Family-Centered Maternity Care approach to maternal care in the Ukraine.

Null Hypothesis: There is no relationship between Family-Centered Maternity Care and the cost or quality of care.

linking the cost of inputs with outcomes (**see Figure 1**). The decision tree provides clear insight into the potential impact of the FCMC approach on costs and quality.

As portrayed in the decision tree, the study compared two groups of women: The first group received the FCMC approach while the second did not. The two groups represented the same risk levels and were randomly selected from women admitted for childbirth in one of the two facilities in Donetsk and Odessa. The groups were large enough to represent an adequate sample size to test for significance of the results.

A methodological challenge immediately arose regarding group selection: how to determine that all group members presented a common risk level? The specific concern was that some women, because of their risk level, would pre-select their group. For example, a mother who had a family history of birthing difficulties might pre-select traditional care versus the FCMC approach because the traditional care might be more familiar and considered "less risky." Likewise, a mother who has given birth to two or three children without complication or incident might pre-select the FCMC approach. This pre-selection process could potentially bias the conclusions since those who chose to receive FCMC would be inherently healthier and would, therefore, incur lower costs and experience higher quality outcomes than the comparison group. To avoid this bias, the study included only women with low-risk births, according to the Ukrainian risk categories. This approach was deemed the most reasonable measure to insure comparability and to avoid "pre-selection" risks.

Two sites were involved in the cost study—the Donetsk Regional Center for Mother and Child Care and the Odessa Regional Maternity Hospital. These are the major regional centers for medical care in the Oblast (like a district). Each site provided unique contributions to the cost analysis. In one hospital, the implementation path for FCMC was initially more restrictive and directed at a lower-risk patient pool. At the other facility, the FCMC approach was applied to a higher-risk pool of patients, but the implementation paths for integrating the FCMC approach into traditional care were restricted. Ultimately, these differences doubled the costing and analysis effort, but they enhanced the scope and applicability of the conclusions. In the Donetsk sample, there were 137 patients and an equivalent control group, while in the Odessa group, there were 59 patients and an equivalent control group.

To track the relative success of establishing an FCMC approach to care, counterpart institutions maintained key statistics on the frequency of the critical components of the FCMC approach (**see Box 3**).[1] These statistics indicate the relative adherence to an FCMC philosophy by each institution. Therefore, the critical components form the underlying basis for the cost study and represent opportunities for cost incidence or cost savings.

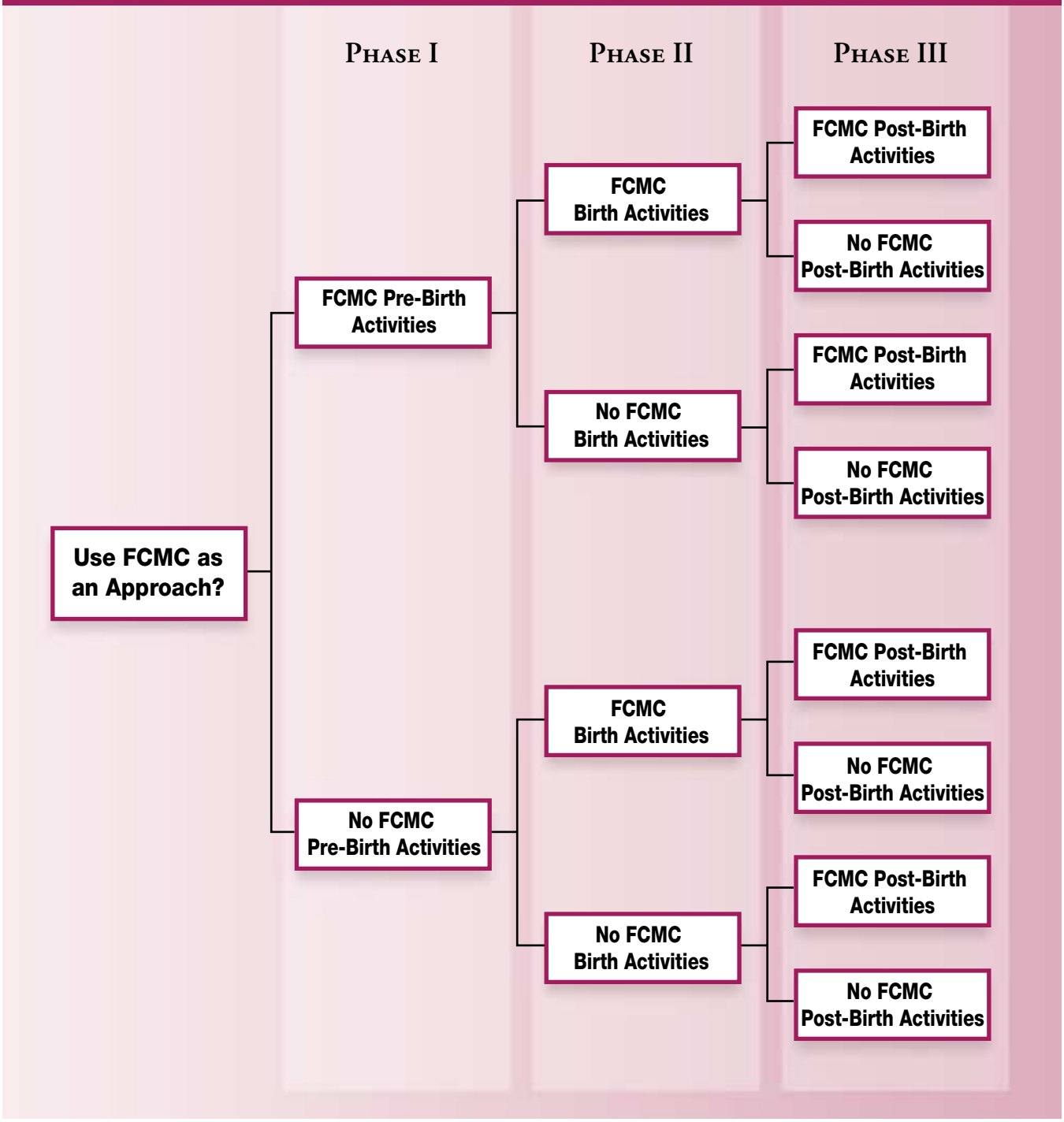
There are numerous possible combinations of these critical FCMC components. For example, one woman might have the first component of FCMC and none of the remaining nine; a second woman might have only the third component, and so on. By grouping the 13 components into three rational sequential categories (called "phases" in the decision tree) according to the general process of the birth event (**see Box 3**), the number of variations can be limited to eight possible integration paths.

[1]A special thanks is given to Ms. Pauline Glatleider. Her earlier field work facilitated this cost study.

The FCMC approach is not an "all-or-nothing" approach, and the ability to allow for cultural, social, clinical, and patient flexibility in the birth process is a central tenet of the approach. Therefore, it was important for the study to avoid an "all-or-nothing" analysis (i.e. accept or reject FCMC) but rather to provide decision-makers with insight into varying degrees of integration and their respective impact on costs and quality. A diagram of these eight integration paths can be seen in **Figure 1**, the Decision Tree for FCMC.

The decision tree allows for a range of labor management possibilities—from a very "pure" FCMC approach to a "purely traditional approach."

Figure 1—Decision Tree



Box 3—Critical Components of FCMC

Pre-Birth—Phase #1

- Ambulation in labor
- Enema
- Perineal shave
- Fetal monitoring

Birth—Phase #2

- Family support during labor
- Analgesia in labor
- Anesthesia for labor and delivery
- Induced labor
- Episiotomy
- Cesarean section

Post-Birth—Phase #3

- Immediate breastfeeding
- Baby rooms with mother
- Infections

The estimated cost impact of each path was evaluated, and by linking these costs with clinical "outcomes," cost-effectiveness ratios could be calculated. ***The result: Generally, the "purer" the FCMC approach employed, the greater the cost savings.*** These results support the FCMC approach by showing a positive relationship between the FCMC path and higher cost-effectiveness.

Integrating the FCMC approach into traditional care methods decreases costs with savings ranging from $7.35 to $16.49 (US$) per patient in these sites in Ukraine. At the same time, FCMC demonstrates positive improvements in numerous key clinical indicators (e.g., increased ambulation in labor, decreased enemas and fetal monitoring). *The study documents that there is a clear, positive relationship between employing an FCMC approach and the cost and quality of care in the Ukraine.*

Of particular interest to decision-makers is the question of exactly who benefits from the cost savings. Given the difficult economic situation in the Ukraine, many medical supplies, including drugs, are paid for directly by the patient. Because medical supplies and other equivalent variable costs represent the majority of cost savings due to an FCMC approach, the woman and her family are seen as the primary beneficiary of cost savings.

Conclusions of Ukraine Family-Centered Maternity Care (FCMC)

- The use of a Family-Centered Maternity Care approach is less invasive to women and less costly to the institution.
- The greatest costs savings are realized in the use of medicines and supplies.
- Alternative integration paths are important and provide clinical and patient flexibility.
- Patient satisfaction appears unusually high.
- Regulatory constraints are seen as primary obstacles to a widespread and rapid acceptance.

Commentary

As demonstrated in the Bolivia and Kenya articles, the use of models for estimating costs of services and essential drugs and supplies based on national performance protocols are useful instruments. These models are especially useful to government policymakers for guiding them to set priorities and establish national standards for providing quality care at each level of care.

The Guatemalan cost study illustrates the cost-savings to the government and the client to promote normal deliveries at a local center rather than at the referral hospital, as long as there is sufficient support of skilled birth providers. In the Ukraine cost study, obstetric care carried out at any level does not need to be costly as long as necessary controls are exercised. The Ukraine study also reemphasizes the cost-efficiency of standardizing care at all levels of the health system.

In the Malawi cost study, it is recommended that the client be encouraged to use health centers instead of hospitals, particularly for routine services such as antenatal care and routine births. This allows hospital personnel to service primarily complicated cases that cannot be handled at health centers and district hospitals, and it lowers the client volume to staff ratio. This recommendation supports the assessment of the *Malawi Health Expenditure Review,*[1] stating that budget allocations to central hospitals in Malawi are too high and should be lowered in favor of rural facilities. This high cost of hospital versus health center services is also evident in Bolivia. While 52 percent of Bolivian clients were treated at the hospital level, 86 percent of the cost is incurred in the hospital.

A universal problem in most developing countries is the lack of 24-hour coverage of services with a skilled birth attendant and a constant supply of essential drugs and equipment. In many countries, women and their families bypass health centers for a higher level of service. The health centers are usually open only eight hours per day, and they generally have inadequate supplies of drugs and lack of staff trained to handle obstetric complications. These deficiencies can create an over-utilization of referral hospitals and an under-utilization of the more accessible district hospitals and health centers, where they can handle certain obstetric complications. Not only are these deficiencies in supplies and staff costly for the client and family (with transportation often being the highest cost) but also for government and private sector referral hospitals.

To provide more cost-efficient 24-hour coverage, trained providers must be based closer to the community with adequate support from the secondary level of care. Many clinicians, hospital administrators, and government officials remain resistant to the delegation of skills although they support decentralized alternative services. Some governments claim they cannot train providers at peripheral levels to acquire additional skills because the cost of in-service training is too high. However, the cost efficiency in managing normal births at more peripheral facilities with staff trained to provide care at this level is an obvious conclusion in the studies reviewed.

[1] World Bank, *Malawi Health Expenditure Review.* Washington, D.C: 1999.

MotherCare Matters is a quarterly newsletter and literature review on maternal and neonatal health and nutrition produced by the MotherCare Project. MotherCare is funded by the Office of Health and Nutrition, U.S. Agency for International Development (Contract No. HRN-C-00-93-00038-00) and implemented by John Snow, Inc., and its subcontractors, the American College of Nurse-Midwives, Family Health International, Program for Appropriate Technology in Health and the London School of Hygiene and Tropical Medicine. The opinions expressed herein are those of the author(s) and do not necessarily reflect the views of USAID and John Snow, Inc.

Inquiries, changes of address and other correspondence should be directed to: ***MotherCare Matters,*** John Snow, Inc., 1616 North Fort Myer Drive, 11th Floor, Arlington, VA. 22209, USA. ***MotherCare Matters*** may be reproduced and distributed freely.

Colleen Conroy, Technical Editor
Carla Chladek, Managing Editor
Carla Chladek and Lea Teclamariam, Production and Distribution Coordinators

MotherCare wishes to acknowledge the contributors to this issue of *MotherCare Matters*—Inga Adams and Robert Burns, RPM; Elizabeth Bocaletti, MotherCare/Guatemala and John Bratt, FHI; Katherine Capra, MotherCare/Bolivia, Eva Weissman, MotherCare/Bolivia consultant, Craig Lissner, WHO and Guillermo Seoane, MotherCare/Bolivia; Brad Else, TEO Resource Management; and Ann Levin, Abt. Associates.

Appreciation is extended to Marge Koblinsky for her careful review and edits and for Carla Chladek who spent countless hours finalizing this edition.

MotherCare™

John Snow, Inc.
1616 N. Ft. Myer Dr., 11th Floor
Arlington, VA 22209
Tel: 703-528-7474
Fax: 703-528-7480

USAID

U.S. Agency for
International Development
Office of Health

Visit our website at www.mothercare.jsi.com